UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/836,490	04/17/2001	Bradley N. Maker	M-9939 US	8530

7590 09/13/2004	EXAMINER
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DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>02 August 2001</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-46 are rejected.

Drawings

2.   The drawings are objected to because the drawing sheet numbering is not larger than the numbering used as reference characters. The labels for sheets 2/9 and 3/9 should appear on the right-hand side. See MPEP 608.02(t). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2.   The abstract of the disclosure is objected to because its title is improper. Proper

titles are "Abstract" or "Abstract of the Disclosure". Correction is required. See MPEP

§ 608.01(b).

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the first paragraph of 35 U.S.C. §112:

> The specification shall contain a written description of the invention and of the manner and process of
> making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the
> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall
> set forth the best mode contemplated by the inventor of carrying out his invention.

4.   Claims 1-24 and 36-46 are rejected under 35 U.S.C. §112, first paragraph,

because the specification, while being enabling for switching between an implicit

method and an explicit method of simulation within a finite element analysis computer

program (page 15, lines 1-16; page 17, lines 6-12; page 18, lines 2-9), does not

reasonably provide enablement for every conceivable means for switching between an

implicit method and an explicit method of finite element simulation. The specification

does not enable any person skilled in the art to which it pertains, or with which it is most

nearly connected, to make the invention commensurate in scope with these claims.

Claims 1, 14 and 36 are single means/step claims. Therefore consequently cover every

conceivable means for switching between an implicit method and an explicit method of

finite element simulation, while the specification discloses at most only those means of

switching known to the inventor. See MPEP 2164.08(a).

5.   Claims not specifically mentioned are rejected by virtue of their dependence.

6.   The following is a quotation of the second paragraph of 35 U.S.C. §112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7.   Claims 1-46 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8.   Regarding claims 1-11, 14-22, 25-33 and 36-44, it is unclear what is meant by "explicit method" with regard to a finite element simulation. It is unclear what is meant by "implicit method" with regard to a finite element simulation. It is unclear what makes the method implicit or explicit. It is unclear how the method exhibits characteristics of being implicit or explicit. The redefinition of these terms as "explicit finite element method" and "implicit finite element method" (page 2, lines 1-2) provides no further insight. See claim interpretation below.

9.   Regarding claims 8-10, 14, 19-21, 25, 30-32, 36 and 41-43, it is unclear what is meant by "automatically switching". It is unclear what aspect of the switching is performed automatically. It is unclear if the switching is automatically initiated. It is unclear if switching occurs randomly or in response to some condition. See claim interpretation below.

10.   Regarding claim 2, the term "switching occurs automatically" is unclear as explained in relation to "automatically switching" above. See claim interpretation below.

11.   Regarding claims 6, 7, 17, 18, 28, 29, 39 and 40, it is unclear what is meant by "solution to a finite element simulation is determined". It is unclear what constitutes a solution to a finite element simulation. It is unclear if the claimed invention ends the simulation after finding the solution for a given time step. It is unclear whether a solution to a finite element simulation relates to input that produces a desired simulation result or the completed simulation result itself. See claim interpretation below.

12.   Claims not specifically mentioned are rejected by virtue of their dependence.

Claim Interpretation

13.   Regarding claims 1-11, 14-22, 25-33 and 36-44, the term "implicit method" is interpreted as "direct solution of governing equations" according to page 2, lines 5-8. The term "explicit method" is interpreted as "incremental solution for each node point" according to page 4, lines 19-24.

14.   Regarding claims 8-10, 14, 19-21, 25, 30-32, 36, 41-43, the term "automatically switching" is interpreted as "switching as a result of certain conditions within the simulation," according to page 12, lines 1-8.

15.   Regarding claim 2, the term "switching occurs automatically" is interpreted as "switching occurs as a result of certain conditions within the simulation," according to page 12, lines 1-8.

16.   Regarding claims 6, 7, 17, 18, 28, 29, 39 and 40, the term "solution to a finite element simulation is reached" is interpreted as "the total simulation time is reached" according to page 13, line 25 – page 14, line 1.

Claim Rejections - 35 USC § 102

17.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. §102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

18.   Claims 1, 2, 5, 7-10, 12, 14, 16, 18-21, 23, 25, 27, 29-32, 34, 36, 38 and 40-43

rejected under 35 U.S.C. §102(e) as being anticipated by Karafillis et al. US Patent No.

6353768.

19.   Regarding claim 1, Karafillis et al. teaches a method of performing a finite

element simulation (column 1, line 66 – column 2, line 11) wherein

an implicit method is used (column 4, lines 23-29; column 5, lines 18-24),

an explicit method is used (column 3, lines 31-42; column 6, lines 42-46),

and the method employed switches from implicit to explicit when contact

penetration is detected (column 6, lines 47-65).

20.   Regarding claim 2, Karafillis et al. teaches that the switching occurs automatically

when contact penetration is detected (column 6, lines 47-65).

21.   Regarding claim 5, Karafillis et al. teaches that the finite element simulation uses

the explicit method when contact penetration is detected (column 6, lines 47-65).

Starting the simulation with initial conditions including contact penetration will cause the invention of Karafillis et al. to begin the simulation by using the explicit method.

22.   Regarding claim 7, Karafillis et al. teaches ending the finite element simulation if the termination time for the simulation is reached while using an explicit method. Karafillis et al. teaches the use of an explicit method when contact penetration is detected (column 6, lines 47-65). If the end time of the simulation is reached during a period where contact penetration is detected, the invention of Karafillis et al. will end using the explicit method.

23.   Regarding claim 8, Karafillis et al. teaches automatically switching from the implicit to explicit method if the number of iterations in the implicit method exceeds a predetermined threshold number (column 6, lines 47-65). Karafillis et al. teaches that the user may enter a certain number of contact checks per simulation. In situations where contact penetration has occurred, the simulation will continue advancing the time step iterations until a periodic contact check is reached. At that time step, contact penetration will be detected and the simulation will switch to an explicit method. The predetermined threshold number is the number of time step iterations between periodic contact checks.

24.   Regarding claim 9, Karafillis et al. teaches that the simulation switches from an implicit to an explicit method as the result of internal energy exceeding a predetermined threshold number (column 6, lines 10-65). The simulation computes nodal positions, velocities and accelerations at each time increment. When the result of such computations result in contact penetration in the model the simulation switches to an

explicit method. The predetermined threshold number is the number at which contact penetration occurs for the simulated materials and their properties.

25.   Regarding claim 10, Karafillis et al. teaches automatically switching from an explicit method to an implicit method if the length of time spent in the explicit method exceeds a predetermined threshold time period (column 6, lines 47-65). Once the simulation has detected contact penetration by using a periodic contact check, the simulation will continue with an explicit method until the contact penetration condition is corrected. An additional periodic contact check is necessary to determine that the contact penetration condition is corrected. The predetermined threshold time period is some positive integer multiple of the time between periodic contact checks.

26.   Regarding claim 12, Karafillis et al. simulates the formation of a metal shape with finite element simulation (column 1, line 66 – column 2, line 11; Fig. 1).

27.   Claims 14, 16, 18-21 and 23 are rejected with the same reasons given for claims 1, 5, 7-10 and 12 above, respectively. Claims 14, 16, 18-21 and 23 are computer product claims reciting the same limitations as the method claims 1, 5, 7-10 and 12. The invention of Karafillis et al. is stored on a computer readable medium (Karafillis et al., column 2, lines 25-29).

28.   Claims 25, 27, 29-32 and 34 are rejected with the same reasons given for claims 1, 5, 7-10 and 12 above, respectively. Claims 25, 27, 29-32 and 34 are computer system claims reciting the same limitations as the method claims 1, 5, 7-10 and 12, and computer product claims 14, 16, 18-21 and 23. The invention of Karafillis et al. is stored

on a computer readable medium and executed on one or more computers (column 2, lines 25-29; Fig. 2).

29.   Claims 36, 38 and 40-43 are rejected with the same reasons given for claims 1, 5 and 7-10 above, respectively. Claims 36, 38 and 40-43 are carrier wave claims reciting the same limitations as the method claims 1, 5 and 7-10, the computer product claims 14, 16 and 18-21, and computer system claims 25, 27 and 29-32. It is deemed inherent that a semiconductor processor executes computer programs transmitted to it as data signals embodied in carrier waves. The invention of Karafillis et al. is stored on a computer readable medium and executed on one or more computers (column 2, lines 25-29; Fig. 2).

30.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. §102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

31.   Claims 1, 3, 4, 6, 7, 11, 13, 14, 15, 17, 18, 22, 24, 25, 26, 28, 29, 33, 35, 36, 37, 39, 40, and 44 are rejected under 35 U.S.C. §102(b) as being anticipated by LS-DYNA Keyword User's Manual by Livermore Software Technology Corporation, hereafter referred to as Livermore Software Technology Corporation.

32.   Regarding claim 1, Livermore Software Technology Corporation teaches software for performing a finite element simulation (pages I.1-I.2) wherein

an implicit method and an explicit method is used (7.28-7.29, remarks for IMFLAG value 2) and

switching from the implicit method to the explicit method during the simulation (7.29, remarks for IMFLAG value 2; 18.8, Remarks for Seamless Springback)

33.   Regarding claim 3, Livermore Software Technology Corporation teaches that the user gives input specifying whether or not to switch from explicit to implicit simulation and the number of time steps in the nonlinear springback (7.28-7.29, Variable Description for IMFLAG value 2 and NSBS).

34.   Regarding claim 4, Livermore Software Technology Corporation teaches that the finite element simulation begins the finite element simulation using the implicit method (7.28-7.29; 18.6; 18.8-9, "Remarks for Seamless Springback").

35.   Regarding claim 6, Livermore Software Technology Corporation teaches ending the finite simulation when the total termination time, expressed as a standard termination time and a number of time steps in the springback analysis, is reached while using an implicit method (7.28-7.29, Variable Description for IMFLAG value 2 and NSBS).

36.   Regarding claim 7, Livermore Software Technology Corporation teaches ending the finite simulation when the total termination time, expressed as a standard termination time and a number of time steps in the springback analysis, is reached while using an explicit method (7.28-7.29, Variable Description for IMFLAG value 2 and NSBS)

37.   Regarding claim 11, Livermore Software Technology Corporation teaches an explicit simulation which reaches its termination time and switches to and concludes with an implicit simulation to perform springback analysis (7.28-7.29; 18.6-18.9, "Remarks for Seamless Springback").

38.   Regarding claim 13, Livermore Software Technology Corporation teaches the use of finite element simulation to simulate springback (I.7, "Trim curves for metal forming springback"; 18.6-18.9, "Remarks for Seamless Springback").

39.   Claims 14, 15, 17, 18, 22 and 24 are rejected with the same reasons given for claims 1, 4, 6, 7, 11, and 13 above, respectively. Claims 14, 15, 17, 18, 22 and 24 are computer product claims reciting the same limitations as the method claims 1, 4, 6, 7, 11, and 13. LS-DYNA Version 950 is a computer software product (Livermore Software Technology Corporation, pages I.1-I.12).

40.   Claims 25, 26, 28, 29, 33 and 35 are rejected with the same reasons given for claims 1, 4, 6, 7, 11, and 13 above, respectively. Claims 25, 26, 28, 29, 33 and 35 are computer system claims reciting the same limitations as the method claims 1, 4, 6, 7, 11, and 13 and computer product claims 14, 15, 17, 18, 22 and 24. LS-DYNA Version 950 is a computer software product executable by a computer (Livermore Software Technology Corporation, pages I.1-I.12).

41.   Claims 36, 37, 39, 40 and 44 are rejected with the same reasons given for claims 1, 4, 6, 7, and 11 above, respectively. Claims 36, 37, 39, 40 and 44 are carrier wave claims reciting the same limitations as the method claims 1, 4, 6, 7, and 11, the

computer product claims 14, 15, 17, 18, and 22, and computer system claims 25, 26, 28, 29, and 33. It is deemed inherent that a semiconductor processor executes computer programs transmitted to it as data signals embodied in carrier waves. LS-DYNA Version 950 is a computer software product executable by a computer (Livermore Software Technology Corporation, pages I.1-I.12).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (703) 305-0542 or (571) 272-3713 beginning in October 2004. The examiner can normally be reached on 8am-4pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin J Teska can be reached on (703) 305-9704 or (571) 272-3716 beginning in October 2004. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.
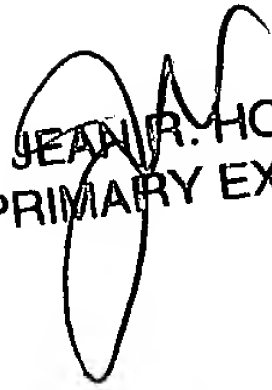
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Jason Proctor
Examiner
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